

What is claimed is:

1. A regulator comprising:

5        a body having a primary port for introducing a fluid under pressure and a secondary port for delivering the fluid regulated to a desired pressure;

10      a valve head displaceably disposed in said body for being unseated from and seated on a valve seat for opening and closing a fluid passage which interconnects said primary port and said secondary port;

      a rod coupled to said valve head for displacement in unison with the valve head;

15      a diaphragm engaging said rod and flexible for displacing said rod in an axial direction of said rod; and

      a back pressure chamber defined at an end of said rod for acting in a direction to cancel out a pressure applied to said valve head, and an aspirator chamber defined closely to said valve head for developing a pressure lower than a pressure in said secondary port due to a suction caused by a 20 nozzle, said rod having a communication hole which provides fluid communication between said back pressure chamber and said aspirator chamber.

2. A regulator according to claim 1, further comprising

25      a valve seat member which has said valve seat, said valve seat member having a tapered surface providing a fluid passage cross section which progressively spreads along the

fluid passage communicating with said secondary port.

3. A regulator according to claim 2, further comprising  
an aspirator holder, said aspirator chamber being defined by  
5       said aspirator holder, said aspirator holder having a  
slanted surface, said fluid passage cross section being  
provided so as to progressively spread between said slanted  
surface of said aspirator holder and said tapered surface of  
the valve seat member.

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4. A regulator according to claim 1, wherein said valve  
head is mounted on a guide member connected to an end of  
said rod, said valve head being guided by a valve head guide  
member having a guide sleeve which surrounds an outer  
15       circumferential surface of the guide member except for said  
valve head.

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5. A regulator according to claim 4, wherein a  
fluororesin coating is applied to a sliding region of the  
20       outer circumferential surface of the guide member and the  
guide sleeve.

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6. A regulator according to claim 4, wherein a pair of  
sealing members spaced a predetermined distance from each  
25       other axially of the guide member which is cylindrical is  
disposed between said guide member and said guide sleeve.

7. A regulator according to claim 6, wherein each of  
said sealing members comprises an O-ring.

5           8. A regulator according to claim 6, wherein an annular  
space communicating with a communication hole extending  
axially of said rod is defined between said sealing members.

10           9. A regulator according to claim 4, wherein said valve  
head guide member is separate from said body.

15           10. A regulator according to claim 9, wherein said  
valve head guide member has a hole defined centrally therein  
which is contiguous to said guide sleeve, said hole being  
closed by a removable closure member.

20           11. A regulator according to claim 1, further  
comprising a leaf spring disposed in said pilot chamber for  
applying a sliding resistance to said first diaphragm, said  
leaf spring having a leg with a curved portion held in  
contact with a cylindrical bushing of stainless steel which  
is mounted in said body.

25           12. A regulator according to claim 11, wherein said  
leaf spring has an outer surface coated with at least a  
diamond-like carbon coating.

13. A regulator according to claim 11, further

comprising a first adjustment member and a second adjustment member for adjusting in two stages the spring force of a spring for pressing said diaphragm toward said valve head.

5           14. A regulator according to claim 1, wherein said regulator is incorporated in a fuel cell system having a fuel cell stack having an anode and a cathode;  
              said regulator being mounted in a bypass passage between a pressure controller for discharging a pressure to  
10          the secondary port which has been regulated depending on a pilot pressure, and an anode humidifier for humidifying a fuel delivered from an ejector to a predetermined humidity and supplying the humidified fuel to said fuel cell stack.

15          15. A regulator according to claim 14, wherein said fuel cell system is mounted on an automobile.

16. A regulator according to claim 1, wherein said regulator is incorporated in a fuel gas supply device, and  
20          comprises:

              a single diaphragm disposed in said body;  
              a spring for pressing said diaphragm toward said valve head; and  
              an adjustment member for adjusting the spring force of  
25          said spring.

              wherein a fuel gas introduced from said primary port is set to a secondary pressure to be discharged from said

secondary port by the spring force of said spring which has been adjusted by said adjustment member.